

WHAT IS CLAIMED IS:

1. A method of bonding a metallic membrane with metallic part comprising:

5 mechanically pressing a smooth surface of the metallic membrane against a smooth surface of the metallic part;

heating the metallic membrane and metallic part to a temperature above the half melting point of the metallic membrane while subjecting the metallic membrane and metallic part to a controlled environment of a gas atmosphere.

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2. The method of claim 1 wherein the mechanically pressing is in the range of 100 psig to 10,000 psig.

15 3. The method of claim 1 wherein the pressure exerted by the mechanically pressing together of the metallic membrane and the metallic part is in the range of about 1,000 psig to about 3,000 psig.

20 4. The method of claim 1 wherein the heating to a temperature above the half melting point is to a temperature between 450°C and 1100°C.

5. The method of claim 1 wherein the metallic membrane comprises palladium.

25 6. The method of claim 1 wherein the metallic membrane is a palladium-based foil.

7. The method of claim 1 wherein the metallic membrane is 75%/wt Pd-25%/wt Ag alloy.

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8. The method of claim 1 wherein the metallic membrane is Pd-Ru alloy.
9. The method of claim 1 wherein the mechanical pressing, the
5 heating and the subjecting to a proper gas atmosphere are carried out for at least 4 hours.
10. The method of claim 1 wherein the mechanical pressing, the
10 heating and the subjecting to a proper gas atmosphere are carried out for at least 5 hours.
11. The method of claim 1 wherein the mechanical pressing, the
heating and the subjecting to a proper gas atmosphere are carried out for
15 about 24 hours.
12. The method of claim 1 wherein the mechanical pressing, the
heating and the subjecting to a proper gas atmosphere are carried out for
about 30 hours.
- 20 13. The method of claim 1 wherein the proper gas atmosphere comprises one of hydrogen, inert gas or a mixture thereof.
14. The method of claim 1 wherein the pressurized gas comprises
25 hydrogen.
15. The method of claim 1 wherein the pressurized gas comprises an
inert gas or its mixture.
16. A method of bonding a first metal object to a second metal object
30 comprising:

mechanically pressing a surface of the first metal object against a surface of the second metal object; and

heating the first and second metal objects above the half melting point of one of the first and second metal objects, while being subjected
5 to a proper gas atmosphere.

17. The method of claim 16 further comprising:
polishing the surface of the first metal object; and
polishing the surface of the second metal object prior to the
10 mechanical pressing.